

Bohnenberger's 'Zeitschrift für Astronomie,' having an aperture of 3 inches, and a focal length of 46 inches, French measure, which bears a power of from 300 to 360 extremely well. The success of this object-glass has induced him to attempt the construction of a similar refractor with an aperture of 54 lines, and a focal length of only 48 inches.

Professor v. Kobell has announced to the same Academy the discovery of a new acid, dianic acid, in the mineral called tantalite, from Tammela, euxenite, æschynite, and samarskite.

December 20, 1860.

General SABINE, Treasurer and Vice-President, in the Chair.

The following communications were read :—

- I. "Notice of recent Scientific Researches carried on abroad."
By the FOREIGN SECRETARY.

On the 29th of last November, an extract was read before the Berlin Academy from a memoir on the magnetization of iron and steel, by Professor Wiedemann. In following up his investigations on the relation between the magnetic and mechanical properties of iron and steel, published in the 'Verhandlungen der Baseler Naturforschenden Gesellschaft,' Band II., Professor Wiedemann has obtained the following results :—

1. If an iron wire be twisted during or even after the passage of a voltaic current through it, the wire becomes magnetic.

When the wire is twisted in the manner of a right-handed screw, the point at which the current enters becomes a south pole, in the opposite case it becomes a north pole. If, during the passage of the current, the wire be twisted in different directions, the polarity changes with the direction of the twist. If it be twisted in different directions after the interruption of the current, the magnetism produced by the first twisting diminishes rapidly.

2. If a voltaic current be transmitted through a magnet in the direction of its axis, the magnet will twist.

The experiments were made with wires of iron and steel, of from 1 to 2 millimetres in diameter, surrounded by a voltaic helix, and stretched

by weights attached to their lower ends. The torsion was measured by observing the image of a scale reflected in a mirror fastened to the lower end of the wire.

When the south pole of the magnetized wire was uppermost, and the current descends, the lower end of the wire, as seen from above, twists in the direction of the motion of the hands of a watch. A change in the direction of either the transmitted or the magnetizing current changes the direction of the torsion.

As long as the magnetizing current remains constant, the torsion increases with the intensity of the transmitted current till it reaches a maximum.

When the intensity of the magnetizing current increases, the transmitted current remaining unchanged, the torsion diminishes.

The torsion of the wire is nearly independent of the weight by which it is stretched, as long as the intensities of the magnetizing and the transmitted current remain invariable.

3. The same torsion is produced when a voltaic current is transmitted through iron wires which have been for some time suspended vertically, and thus magnetized by the magnetism of the earth, or which have acquired permanent magnetism in any other manner.

4. A voltaic current being transmitted through an iron wire suspended in the axis of a spiral, if a weak current be afterwards transmitted through the helix, the wire will twist in the same direction as if the current had been transmitted first through the spiral and afterwards through the wire. The torsion increases with the intensity of the magnetizing current till it attains a maximum. On increasing further the intensity of the magnetizing current, the torsion diminishes.

5. If an iron wire be suspended in the axis of a helix, and temporarily magnetized, the intensity of the temporary magnetism will be weakened on transmitting a voltaic current through the wire.

On interrupting the current through the wire, the temporary magnetism of the wire will be increased. If the circuit be completed repeatedly, whatever be the direction in which the current is transmitted through the wire, the temporary magnetism will diminish, and on interrupting the current will resume its original intensity.

6. If a voltaic current be transmitted through the iron wire after the magnetizing current has been interrupted, its permanent magnetism will be weakened.

On interrupting the current the permanent magnetism will increase a little, but will not regain its original intensity. Repeated transmission of a current through the wire produces only a feeble diminution of its permanent magnetism. If a current be transmitted through the wire in an opposite direction, the magnetism will again be greatly enfeebled.

7. When a large portion of the permanent magnetism has been destroyed by repeated inversion of the current transmitted through the wire, and a current is made to pass through it first in one direction and then in the contrary direction, the magnetization in one case is found to be much stronger than in the other. At the same time a very gradual diminution of magnetism is continually observable.

In the opinion of Professor Wiedemann, these phenomena may be explained by the self-same hypotheses which he used to illustrate his former observations on the relation between torsion and magnetism. These are :—

1. The hypothesis of molecular magnets, which take a direction under the influence of a voltaic current and are thereby caused to rotate round their centres of gravity, and also to glide past one another, as in the case of torsion.

2. The hypothesis, that the molecular magnets, after their movements of translation and rotation, do not return quite to their original unmagnetic positions of equilibrium, even after the disturbing forces have ceased to act, so that bodies composed of these molecular magnets retain a permanent magnetism, and in certain cases, a permanent change of form, viz. torsion.

II. “Preliminary Notice of Researches into the Chemical Constitution of Narcotine and of its Products of Decomposition.”

By A. MATTHIESSEN, Esq., and GEORGE C. FOSTER, Esq.

Communicated by Professor A. W. WILLIAMSON, Ph.D.

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I. *Composition of Narcotine.*

The announcement made by Wertheim* and Hinterberger† of the probable existence of various kinds of narcotine, rendered it necessary

* Liebig and Kopp's Jahresbericht, 1851, p. 469.

† Ibid.